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WPI(ONLINE DATABASE) JAPIO(ONLINE DATABASE)

(54) An electronic device with a screen

(57) The device comprises a casing (1) which includes a touch sensitive panel (3) that faces the opposite way from a display screen (6) and may underlie it. Pressure or movement on the touch sensitive panel (3) may, depending upon the particular programming, cause a corresponding change in the display. Electronic devices such as mobile phones and hand-held games may be made smaller and more easily operable by such a device.

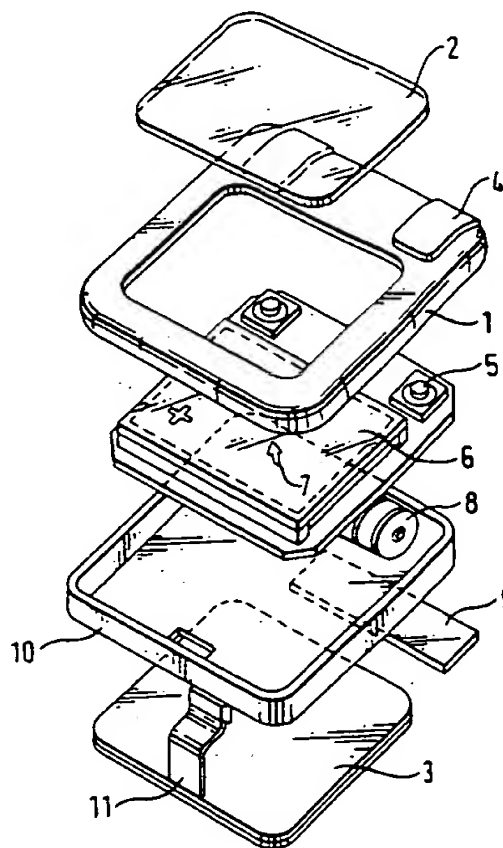


FIG. 2

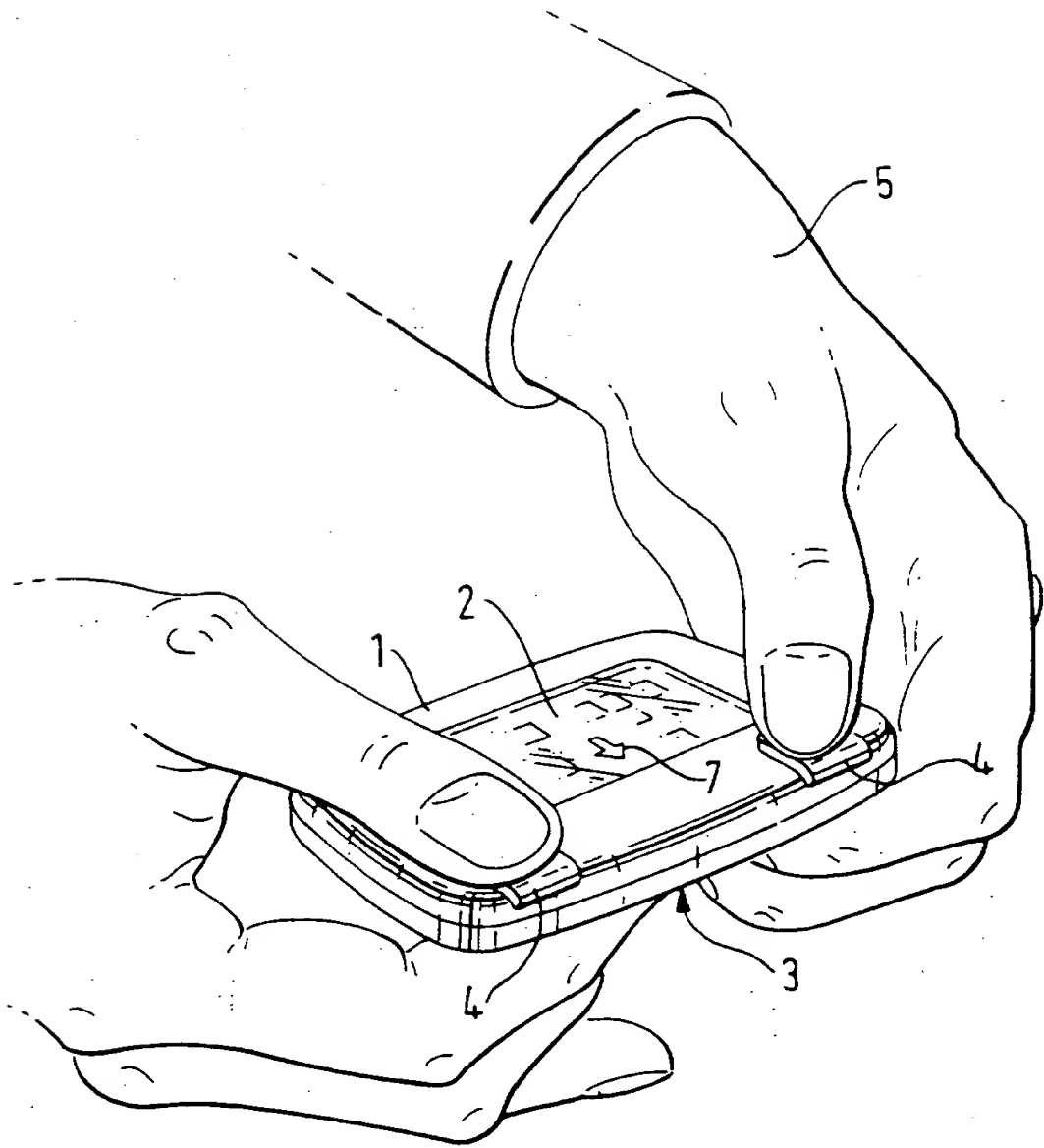


FIG. 1

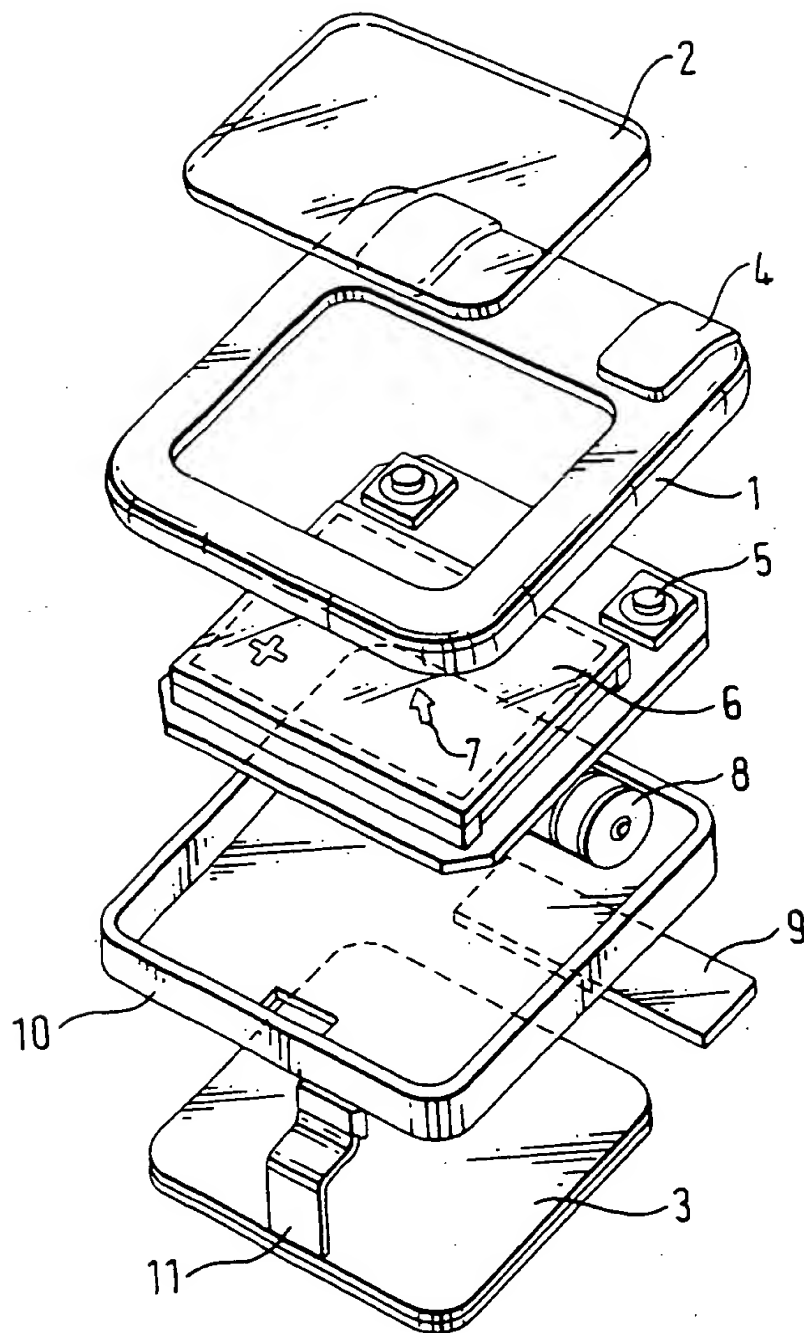


FIG. 2

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ELECTRONIC DEVICES WITH A SCREEN

5 This invention relates to electronic devices with a screen.

10 Many such devices are known in commerce. The nature of the screen varies widely, but all are designed to be viewed by a user with the object of discerning what is on the screen, processing that information mentally and taking whatever action is then appropriate. In many such devices, the desired action leads to a change in the screen display, which may lead the user to take further action, and so on.

15 In many electronic applications, for example personal computers, microwave ovens and air traffic control installations, the screen may be large and fixed, whether a conventional cathode ray tube or a more recently developed flat panel display screen of appropriate type. 20 However, in many cases the screen is small and it is used in hand held, or at least portable, apparatus. Manufacturers often strive to produce such apparatus in ever smaller casings, and advances in microelectronic

technology have assisted this. A wide range of such devices is now available.

5 A typical example of such a device is a portable or
mobile telephone, or a hand held game device, for example
that widely sold under the registered trade mark GAMEBOY.
In addition to housing the screen, the housing or casing
of such devices surrounds the necessary power supply,
electronics and other components, and usually has a
10 number of buttons or the like by means of which the
device can be made to perform its function. Generally
such buttons or the like are arranged to one side of the
screen and substantially level with it. This constrains
the size of the overall device to be at least big enough
15 to accommodate both on one face of the device, preferably
with sufficient spacing between the buttons to allow easy
operation, i.e. the buttons must not be too close
together that the user pressing one tends to press an
adjacent one. The problem of compressing the parts of
20 such input devices have been widely recognised (see e.g.
Graham Pitcher, "The whole world in your hand?", New
Electronics, 28th March 1995, pages 18-21), but solutions
have tended to be complex and require substantial
technical outlay.

25 A further problem is that if the buttons or the like are
too close to the screen, actuating one tends to cause the
user's hand partially to obscure the view of the screen,
so reducing the ease and efficiency of use. Obscuring the
30 screen while using the device is a major problem with
some computer notebook apparatus or palmtop computers
working with a WIMP operating system or stylus input
where the user is actually required to put pressure on a
particular area of the screen. In such devices, the

screen is overlaid with a transparent "touch screen", through which the display screen is visible, and which is connected to appropriate electronics to detect where the touch screen is being touched. The mouse and pointer of a WIMP system can thus be avoided, saving space and cost, but at the expense of ease of operation.

We have now found that material improvements in ease of operation may be achieved by the use of a touch sensitive panel which may be of known touch screen type, but which, instead of overlying the display screen or located to one side of it, faces the other way. The term touch sensitive panel as used herein is intended to encompass a wide range of electronic devices or arrays which can be contacted or touched by the finger(s) of a user and which can be sensed electrically to provide a signal representative of finger position and/or movement. It includes button arrays, panels with inset rollerballs or joysticks, and capacitative sensor arrays, but devices of the known touch screen type are preferred for most applications.

Thus, according generally to the present invention, there is provided an electronic device comprising a casing, a display screen to be viewed by the user, and a touch sensitive panel, the touch sensitive panel facing substantially away from the user when the display screen is towards the user.

The touch sensitive panel is preferably partly or wholly underlying the display screen so that the overall size of the device casing may be minimised. The position of the touch sensitive panel may, however, be variable with respect to the display screen, either translationally

substantially in the plane of the panel, or rotationally about an axis. The panel may even be brought, if desired, to lie alongside the display screen if appropriate for some particular purpose.

5

The devices of the present invention are preferably configured as hand-held devices, though the applications of the invention are not so limited. For example, a computer input device is conceivable having a
10 programmable display screen on one side and a touch sensitive panel on the other, the device being connected via a cable to a computer with a large display screen on which the display is uncluttered by icons, toolbars, etc, these being displayed on the display screen of the
15 device. Another possibility is for the touch sensitive panel to be on the underside of a palmtop computer or behind the screen of a laptop computer, and to be located underneath one corner of the main display screen. The programming may cause a small window to be displayed in
20 that corner, the contents of which may be controlled by a fingertip on the touch sensitive panel.

However, the major area of application of the invention is seen to lie in the design of small hand-held stand-
25 alone items such as mobile telephone units, hand-held games, hand held computers, known sometimes as "organisers", calculators, measuring instruments, and remote controllers for fixed audio, video or multi-media equipment.

30

The touch sensitive panel used in the device of the present invention may be of any known type, and its operation controlled in known fashion by suitable electronics. It may be one sensitive merely to contact or

close proximity of the users finger, or a so-called
"pressure-sensitive" type, where the electronics may
discriminate between light and heavier pressure. It does
not, of course, have to be transparent (as those used
5 over screens in the prior art needed to be), though it
may be.

In particular, it may be useful in certain embodiments of
the invention, to provide that the touch sensitive panel
10 can be moved from a position facing away from the display
screen to one overlying it, e.g. by swivelling it through
360° about an axis adjacent one edge of the display
screen. In such a case, the touch sensitive panel needs
to be transparent in order that when it is in the
15 position overlying the display screen, the image on the
display screen is still visible to the user.

In using devices of the present invention, the user has
an uninterrupted view of the screen, while the device is
20 operated "from the back", usually by pressure with the
tip of the index finger or the fingernail thereof. It is
found that the sensitivity of movement of the index
finger is very high, enabling it to be used, e.g. to move
a pointer on the screen or an icon e.g. in a games
25 programme. Additionally, even though the user may not be
able to see his or her fingertip, such is the sensitivity
of the proprioceptive nerve system in humans that the
user knows where it is, and can thus align it without
difficulty under a desired area of the display screen.

30

In appropriate applications, the touch sensitive panel
may be able to respond to two or more applied fingertips;
the device may be held in two hands with the thumbs on
top and the fingers underneath.

The device of the present invention may include other input components, such as spring-loaded buttons or proximity switches, located adjacent the display screen or elsewhere on the casing, even e.g. beneath a touch sensitive panel, but their number may be kept to a minimum. Input components are not limited to tactile ones; for example the device may include a microphone and circuitry adapted to produce a signal on an appropriate audio input. A simple such circuit may translate a "click" or other sudden sharp noise into an "enter key" signal, while more complex and sophisticated circuits may employ speech or voice recognition to provide a suitable input signal selected from a wider range.

By way of example of a device according to the present invention, a simple hand-held game is illustrated in the accompanying drawings, in which:

Figure 1 shows a perspective view of a hand-held game being held by two hands of a user and

Figure 2 is a diagrammatic exploded view of the game shown in Figure 1.

Referring to these drawings, a simple hand-held game consists of a substantially rectangular casing 1 with rounded corners. On one side of the casing 1 there are two buttons 4 and a transparent casing window 2 underlying which is a planar liquid crystal display 6. The lower portion of the casing as seen in Figure 1 and which is identified as 10 in Figure 2 has on its undersurface a digitising touch sensitive panel or pad unit 3 with the touch sensitive face of pad 3 facing away from casing 1.

The main games circuitry and display are integrated together on a central circuit board which carries a pair of spring switch buttons 5, the liquid crystal display unit 6, and has appropriate connector areas to enable it to be supplied with power from a battery 8 and to interface with the digitising touch pad 3 via a ribbon connector 11.

As can be seen, the lower moulding 10 of the casing as a door 9 enabling access to the battery compartment.

As also indicated in Figure 1 and Figure 2, a cursor arrow or pointer denoted 7 may be caused to appear on LCD 6.

The two buttons 4 overlie the two pressure activatable switches 5 and one may be configured electrically to operate as an on/off switch and with the other or both subsequently operable as part of the particular game embodied in the circuitry underlying LCD 6.

The position of the pointer 7 or other discrete graphic areas of the display may be respectively changed or selected by the pressure and position of the index fingers of the user's hands, denoted 5 in Figure 1, on the digitiser pad 3.

The nature of the display on the LCD, the nature of the programming in the conventional microchip underlying it, and the way in which the game is played can be analogous to those in existing products and form no part of the present invention. The difference lies in the fact that in many existing products of this type, the game is played using, e.g. the thumbs or fingers of the player's

hands on the front of the device in contrast to the present case where the game is played predominantly by using the forefingers on the back of the device allowing the thumbs to operate buttons and/or assist in holding the device steady and permitting a continuous and uninterrupted view of the screen. For a given size screen, the overall size of the device can be smaller than comparable games hand-held units currently on the market. Looked at from an alternative point of view, hand-held units of a size similar to that currently acceptable in the marketplace can now have a very much enlarged screen.

CLAIMS

1. An electronic device comprising a casing, a display screen to be viewed by the user, and a touch sensitive panel, the touch sensitive panel facing substantially away from the user when the display screen is towards the user.
2. An electronic device according to Claim 1 wherein the touch sensitive panel is partly or wholly underlying the display screen.
3. An electronic device according to Claim 1 or 2 wherein the overall size of the device is adapted to be hand-held with one or more index fingers of the user in contact with the touch sensitive panel.
4. An electronic device according to any one of Claims 1 to 3 wherein the touch sensitive panel is connected directly to an electronic circuit controlling a display on the display screen in such a fashion that contact or movement of a finger on the touch sensitive panel causes a corresponding change in the display on the display screen.
5. An electronic device according to any one of the preceding Claims wherein the touch sensitive panel is adapted to provide an indication of contact and of contact pressure to associated electronics.
6. An electronic device according to any one of the preceding Claims and including one or more input buttons or the like mounted in the casing.

7. An electronic device according to any one of the preceding Claims and configured as a hand-held game.

5 8. A hand-held game constructed and arranged substantially as hereinbefore described with reference to the accompanying drawings.

Relevant Technical Fields

- (i) UK Cl (Ed.N) B6F; H1N: NBH; F2Y
 (ii) Int Cl (Ed.6) B41J: 5/10; G05G: 9/047; G06F: 3/023;
 G06K: 11/18; H01H 13/70, 25/04

Databases (see below)

- (i) UK Patent Office collections of GB, EP, WO and US patent specifications.
 (ii) WPI (ONLINE DATABASE) JAPIO (ONLINE DATABASE)

Search Examiner
 G WILLIAMS

Date of completion of Search
 12 JUNE 1995

Documents considered relevant ,
 following a search in respect of
 Claims :-
 1-7

Categories of documents

- X: Document indicating lack of novelty or of inventive step. P: Document published on or after the declared priority date but before the filing date of the present application.
 Y: Document indicating lack of inventive step if combined with one or more other documents of the same category. E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.
 A: Document indicating technological background and/or state of the art. &: Member of the same patent family: corresponding document.

Category	Identity of document and relevant passages	Relevant to claim(s)
X	WO 92/04707 A1 (MOHLER) see page 7, lines 1-25 and Figure 7	1
X	US 5128672 (APPLE) see column 4 lines 4-35 and Figure 1	

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).